

Serial No. 09/408,965

Docket No. 22-0056

**LISTING OF THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application:

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1-60. (Cancelled)

61. (New) A method of synchronizing an earth terminal in a satellite communication network, the method comprising:

- 61
- (a) maintaining a downlink symbol counter clocked at a downlink clock rate;
  - (b) determining a downlink symbol count representative of a time of arrival at a satellite of a burst transmitted from an earth terminal;
  - (c) adjusting said downlink symbol counter to correspond to said downlink symbol count;
  - (d) transmitting synchronization bursts from said earth terminal to said satellite in accordance with said downlink symbol counter;
  - (e) determining at said satellite, whether said synchronization bursts received at said satellite are one of early, late, absent, and on time; and
  - (f) reporting in a downlink signal to said earth terminal, a code representing whether said synchronization burst received at said satellite is one of early, late, absent and on time.

62. (New) The method of claim 61 further comprising extracting a downlink symbol counter clock from said downlink signal.

63. (New) The method of claim 61 further comprising determining a length L of a propagation path between said satellite and said earth terminal.

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64. (New) The method of claim 63 further comprising determining an initial estimate of said length L.

65. (New) The method of claim 64 wherein said step of determining an initial estimate of said length L comprises:

- (i) storing an earth terminal location in said earth terminal;
- (ii) providing a satellite position of said satellite to said earth terminal; and
- (iii) determining said initial estimate using said satellite position and said earth terminal location.

66. (New) The method of claim 65 wherein said step of providing a satellite position comprises providing a cell bearing the current coordinates of the satellite.

67. (New) The method of claim 63 further comprising periodically updating the value of said length L.

68. (New) The method of claim 67 wherein said step of periodically updating comprises:

- (i) storing an earth terminal location in said earth terminal;
- (ii) updating a satellite position of said satellite with said earth terminal;
- (iii) redetermining said length L using said satellite position and said earth terminal location.

69. (New) The method of claim 68 wherein said step of updating a satellite position comprises periodically transmitting updated satellite coordinates to said earth terminal.

70. (New) The method of claim 61 wherein said step of determining a downlink symbol count comprises maintaining a downlink frame counter and multiplying by a number of symbols in said downlink frame.

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71. (New) The method of claim 61 further comprising adjusting said downlink symbol counter to account for changes in the length L of a propagation path between said satellite and said earth terminal.

72. (New) The method of claim 61 wherein said step of determining a downlink symbol count comprises extracting a downlink frame number from said downlink signal and multiplying by a number of symbols in said downlink frame.

73. (New) The method of claim 72 further comprising adjusting said downlink symbol counter to account for changes in length L of a propagation path between said satellite and said earth terminal.

74. (New) The method of claim 64 further comprising:

- (i) transmitting a communication signal from said earth terminal to said satellite; and
- (ii) receiving a timing error from said satellite.

75. (New) The method of claim 74 further comprising redetermining said length L using said timing error.

76. (New) The method of claim 75 further comprising storing said length L in said earth terminal.

77. (New) The method of claim 74 wherein said step of transmitting a communication signal comprises transmitting an entry order wire from said earth terminal to said satellite.

78. (New) The method of claim 61 further comprising:  
determining an identification of said earth terminal;

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providing said identification of said earth terminal a network control center;  
generating a synchronization channel assignment for said earth terminal; and  
transmitting said synchronization channel assignment to said earth terminal.

79. (New) The method of claim 78 further comprising adjusting said downlink symbol counter according to said timing error received from said satellite in response to a communication signal transmitted to said satellite from said earth terminal.

80. (New) The method of claim 79 wherein said step of adjusting comprises:  
launching synchronization bursts from said earth terminal to said satellite in said synchronization channel;  
processing said synchronization bursts to determine an uplink timing error associated with said synchronization bursts;  
transmitting said uplink timing error to said earth terminal; and  
adjusting the value of said downlink symbol counter according to said uplink timing error.

81. (New) The method of claim 80 wherein said step of transmitting said uplink timing error comprises transmitting a correction code indicative of said timing error to said earth terminal.

82. (New) The method of claim 81 wherein said step of transmitting a correction code comprises transmitting a code representing one of an early indication or a late indication.

83. (New) The method of claim 81 wherein said step of transmitting a correction code comprises transmitting a multi-bit code representing one of an early indication, a late indication, or an absent indication.

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84. (New) The method of claim 81 wherein said step of transmitting a correction code comprises transmitting a code representing one of an early indication, a late indication, an absent indication, or an on time indication.

85. (New) The method of claim 79 further comprising storing said timing error.

86. (New) The method of claim 85 further comprising, upon re-entry of said earth terminal, adjusting said downlink symbol counter to account for said length L and said stored timing error.

87. (New) A synchronization method for a satellite communication network, the method comprising:

- (a) establishing a communication satellite in orbit;
- (b) establishing an earth terminal in communication with said satellite;
- (c) generating a master clock on said satellite;
- (d) transmitting downlink symbols synchronously with said master clock from said satellite to said earth terminal;
- (e) maintaining at said earth terminal a downlink symbol counter clocked at a downlink clock rate;
- (f) determining a downlink symbol count representative of a time of arrival of a burst transmitted from an earth terminal to a satellite;
- (g) adjusting said downlink symbol counter to correspond to said downlink symbol count upon receipt of a predetermined reference point in a downlink frame;
- (h) transmitting synchronization bursts from said earth terminal to said satellite in accordance with said downlink symbol counter;
- (i) determining at said satellite, whether said synchronization bursts received at said satellite are one of early, late, absent, and on time; and
- (j) reporting in a downlink signal to said earth terminal, a code representing whether said synchronization burst received at said satellite is one of early, late, absent and on time.

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88. (New) The method of claim 87 further comprising extracting a downlink symbol counter clock from said downlink signal.

89. (New) The method of claim 87 further comprising determining a length L of a propagation path between said satellite and said earth terminal.

90. (New) The method of claim 89 further comprising determining an initial estimate of said length L.

91. (New) The method of claim 90 wherein said step of determining an initial estimate of said length L comprises:

- (i) storing an earth terminal location in said earth terminal;
- (ii) providing a satellite position of said satellite to said earth terminal; and
- (iii) determining said initial estimate using said satellite position and said earth terminal location.

92. (New) The method of claim 91 wherein said step of providing a satellite position comprises providing satellite ephemeris data.

93. (New) The method of claim 90 further comprising periodically updating the value of said length L.

94. (New) The method of claim 93 wherein said step of periodically updating comprises:

- (i) storing an earth terminal location in said earth terminal;
- (ii) updating a satellite position of said satellite with said earth terminal;
- (iii) redetermining said length L using said satellite position and said earth terminal location.

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95. (New) The method of claim 94 wherein said step of updating a satellite position comprises periodically transmitting updated satellite coordinates to said earth terminal.

96. (New) The method of claim 87 wherein said step of determining a downlink symbol count comprises maintaining a downlink frame counter and multiplying by a number of symbols in said downlink frame.

97. (New) The method of claim 87 further comprising adjusting said downlink symbol counter to account for a length L of a propagation path between said satellite and said earth terminal.

98. (New) The method of claim 87 wherein said step of determining a downlink symbol count comprises extracting a downlink frame number from said downlink signal and multiplying by a number of symbols in said downlink frame.

99. (New) The method of claim 98 further comprising adjusting said downlink symbol counter to account for a length L of a propagation path between said satellite and said earth terminal.

100. (New) The method of claim 90 further comprising:  
transmitting a communication signal from said earth terminal to said satellite; and  
receiving a timing error from said satellite.

101. (New) The method of claim 100 further comprising redetermining said length L using said timing error.

102. (New) The method of claim 101 further comprising storing said length L in said earth terminal.

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103. (New) The method of claim 100 wherein said step of transmitting a communication signal comprises transmitting an entry order wire from said earth terminal to said satellite.

104. (New) The method of claim 87 further comprising:  
determining an identification of said earth terminal;  
providing said identification of said earth terminal a network control center;  
generating a synchronization channel assignment for said earth terminal; and  
transmitting said synchronization channel assignment to said earth terminal.

105. (New) The method of claim 104 further comprising adjusting said downlink symbol counter according to said timing error received from said satellite in response to a communication signal transmitted to said satellite from said earth terminal.

106. (New) The method of claim 105 wherein said step of adjusting comprises:  
launching synchronization bursts from said earth terminal to said satellite in said synchronization channel;  
processing said synchronization bursts to determine an uplink timing error associated with said synchronization bursts;  
transmitting said uplink timing error to said earth terminal; and  
adjusting the value of said downlink symbol counter according to said uplink timing error.

107. (New) The method of claim 106 wherein said step of transmitting said uplink timing error comprises transmitting a correction code indicative of said timing error to said earth terminal.

108. (New) The method of claim 107 wherein said step of transmitting a correction code comprises transmitting a code representing one of an early indication or a late indication.



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109. (New) The method of claim 107 wherein said step of transmitting a correction code comprises transmitting a multi-bit code representing one of an early indication, a late indication, or an absent indication.
110. (New) The method of claim 107 wherein said step of transmitting a correction code comprises transmitting a code representing one of an early indication, a late indication, an absent indication, or an on time indication.
111. (New) The method of claim 105 further comprising storing said timing error.
112. (New) The method of claim 111 further comprising, upon re-entry of said earth terminal, adjusting said downlink symbol counter to account for said length L and said stored timing error.
113. (New) A method for synchronizing an earth terminal in a satellite communication network, the method comprising:
- transmitting synchronization bursts from an earth terminal to a satellite in accordance with a downlink symbol counter;
  - determining at said satellite, whether said synchronization bursts received at said satellite are one of early, late absent, and on time; and
  - reporting, to said earth terminal, a code representing whether said synchronization burst received at said satellite is one of early, late, absent and on time.
114. (New) A system for synchronizing an earth terminal with a satellite in a communication network, said system comprising:
- an earth terminal transmitting a synchronization burst in accordance with a downlink symbol counter, determining whether said synchronization burst is one of early, late, absent, and on time, and reporting, to said earth terminal, a code representing whether said synchronization burst received at said satellite is one of early, late, absent and on time.

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115. (New) The method of claim 113 further comprising adjusting said downlink symbol counter to account for timing errors in the synchronization burst between said satellite and said earth terminal.

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